

## **Assessing Possible Ecological Risks of Genetically Modified Crops: Gene Expression Assays and Genetic Monitoring of Non-Target Organisms**

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Widespread planting of genetically modified crops with the *Bt* transgene pesticide has led to concern over non-target effects of *Bt* compounds in agroecosystems. While some research suggests that non-target organisms exposed to *Bt* toxin exhibit reduced fecundity and increased mortality, other studies suggest that exposure has little or no effect on non-target organisms. The US EPA is therefore investing in research to better understand the potential risks that *Bt* crops may pose to non-target organisms. Indicator species will first be identified for non-target exposure monitoring in and around *Bt*-corn and *Bt*-cotton agroecosystems. Gene expression assays will subsequently be developed to assess exposure of non-target indicator organisms to *Bt* toxins. These assays will be employed to screen individuals for exposure to *Bt* toxins, while additional genetic monitoring will be done to establish population level responses to *Bt* exposure. Baseline studies of the population genetic structure of non-target indicator species inside and outside of areas planted with *Bt* crops will provide essential information on migration, genetic diversity, and effective population sizes. Further monitoring of indicator species over time will help establish whether localized *Bt* exposure influences the long-term viability of non-target populations. A combination of gene expression assays and population genetic monitoring will provide a comprehensive approach for evaluating how non-target *Bt* exposure may affect individual, population, and ultimately, ecosystem health. Adapting this research to provide field monitoring tools will offer the U.S. E.P.A. Office of Pesticide Programs methods for tracking and mitigating potential non-target effects of *Bt* crops.

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